REMARKS

Claims 1 - 14 remain active in this application. Minor editorial revisions have been made in the Title of the application and in claims 1, 13 and 14. A revised Abstract has been provided on a separate page. New claims 15 - 18 have been added to more fully recite the subject matter regarded to be the invention. Support for the new claims is found in the description of the third and fourth embodiments of the invention on pages 22 - 26 of the original specification. No new matter has been introduced into the application.

The Examiner has objected to the drawings as failing to illustrate the detector recited in claims 13 and 14. This objection is respectfully traversed in view of the amendments made above in which the recitation has been deleted from those claims.

The Examiner has also objected to the Title and Abstract of the application. These objections are also respectfully traversed in view of the revised Title and Abstract which have been supplied. Should the Examiner persist in either of these objections, specific suggestions for further revision would be fully considered.

Claims 13 and 14 have been rejected under 35 USC §112, second paragraph, as being indefinite. This rejection is respectfully traversed since no ambiguity is presented by the term "vertical". However, the rejection is also traversed as moot since the Examiner's suggestion has been adopted in order to expedite resolution of this issue.

Claims 1 - 8 have been rejected under 35 USC §102 as being anticipated by Fork et al. this rejection is respectfully traversed.

As the Examiner is aware, for anticipation to be shown, every recitation of the claimed subject matter must be answered by the teachings of a single document. The subject matter of Fork et al. is directed to an arrangement for developing cumulative exposure of a photosensitive surface in a xerographic printer using organic light-emitting diodes which have relatively low luminance unless driven at a high power level which would unacceptably shorten their useful lifetime. The matrix array of light-emitting elements is integrated on a single insulating substrate. However, Fork et al. contains no teaching or suggestion of integrating horizontal and vertical scanning circuits on the same insulating substrate as the light emitting devices, as recited in claim 1, the use of organic electroluminescent light-emitting devices, as recited in claim 2, or the features recited in claims 3 - 8 in combination with the integrated scanning circuits and light-emitting devices.

More specifically, whiile the Examiner asserts that Fork et al. discloses a xerographic printing system including a picture element array and horizontal and vertical scanning cirduits formed on the same insulating substrate and cites Figure 8 and column 8, lines 13 - 60 in support thereof, it is respectfully submitted that Fork et al. does not, in fact, contain such teachings. Figure 8 is a preferred schematic layout of a four pixel portion of the light emitter array which implements the circuit diagram of Figure 7. It is abundantly clear that no vertical or horizontal scanning circuits are included therein but only data gate and power connections brought out to the edges thereof. Contrary to the Examiner's assertions, the control electronics 22 including gate driver 30 and line driver 32, 34, circuits to which these lines are directed to be connected are illustrated in Figures 1 and 2 of Fork et al. as being separately formed from

LED array 20. The description thereof at column 5, lines 19 - 50, contains no mention of being "formed on a same insulating substrate" with the light-emitting devices, as recited in claim 1, much less the poly-crystal thin-film transistors, now recited in claim 1, which supports such formation/integration of the horizontal and vertical scanning circuits as peripheral circuits with the light-emitting element array.

The claimed feature of integration of the scanning circuits with the light-emitting devices provides the unexpected effects of reducing the number of required connections to the print head, supporting increased miniaturization and high density and print image resolution while maintaining the functions of gray scale printing and allowing use of relatively low luminance light-emitting devices and extending their useful lifetime as well as the functions of facilitating corrections for variations in photosensitivity of the xerographic surface and luminance of the light-emitting devices, and correction for location of the print head so that the print head can be replaced by a user without a need for making fine adjustments. These functions are not addressed by Fork et al.

Accordingly, it is respectfully submitted that the rejection of claims 1 - 8 for anticipation by Fork et al. is clearly in error since Fork et al., while teaching integration of the light-emitting elements in an array, does not teach inclusion of horizontal and vertical scanning circuits on the same insulating substrate, as recited in claim 1, or the particular organic light-emitting devices recited in claim 2.

Therefore, no demonstration of anticipation has been made or can be made based on Fork et al. By the same token, since Fork et al. does not address the problems for which the claimed subject matter provides a solution or lead to an expectation of success in

solving these problems by the expedient of the claimed subject matter, Fork et al. cannot provide evidence of a level of ordinary skill in the art that would negate patentability and therefore, the above-discussed distinction from Fork et al. must be given patentable weight to patentably distinguish thereover.

Claims 9 - 12 have been rejected under 35 USC §103 as being unpatentable over Fork et al. in view of Leksell et al. and claims 13 - 14 have been rejected under 35 USC §103 as being unpatentable over Fork et al. in view of Haneda et al. These rejections are also respectfully traversed since neither Leksell et al. nor Haneda et al. supplements Fork et al. in regard to the deficiencies of the teachings of Fork et al. to answer the recited subject matter of the claims or answer the recitations of the claims to which Leksell et al. and Haneda et al. have been additionally applied.

Specifically, Leksell et al. teaches the formation of groups of individually controllable thin film electroluminescent edge emitter devices in the form of short bars or lines to form a light-emitting pixel for purposes of facilitating manufacture at small sizes. However, the individual pixels of the pixel groups are evidently time multiplexed both by pixel and by pixel groups and the light-emitting locations of individual pixels are spatially separated. Therefore, Leksell et al. does not teach or suggest changing the number of picture elements in a group which are to be activated <u>while</u> activation of picture elements is performed for every group of a line, as recited in each of claims 9 - 12. Leksell et al. contains no teaching or suggestion of formation of the horizontal and vertical scanning circuits on the same insulating substrate as the light-emitting devices and their drivers or any teaching or suggestion which addresses the problems solved thereby in accordance with the present invention, as claimed, as discussed above. Further, it appears that only a

single line of pixel groups is contemplated and thus there is no capability of developing a gray scale or any need for vertical scanning circuitry at all.

Haneda et al. is directed to the adjustment of effective size of small pixels in a pixel group and the appropriate spacing thereof for purposes of developing a gray scale in accordance with a different threshold for each individual small pixel. However, as with Leksell et al. it appears that only a single line of pixel groups is provided and there is no need for a vertical scanning circuit, much less any teaching or suggestion for forming a vertical (or horizontal) scanning circuit on the same insulating substrate with the light-emitting devices or any consideration of the problems solved in accordance with the invention by doing so. Further, while Haneda et al. is concerned with the location of the line print head relative to timing of energization, there is no teaching or suggestion of using a sensor to determine alignment of the print head and to alter energization timing and data shifting to avoid a need for fine adjustment of print head position. The sensing illustrated in Figure 13 and discussed at column 9 of Haneda is for the purpose of achieving registration of respective colors and is performed from the interior of the print drum in accordance with a registration pattern. In other words, it appears that the positional deviation of concern in Haneda et al. for which correction is provided is <u>within</u> the printed image and not compensation for print head location for the purpose of avoiding a need for precision factory alignment. In this regard, it should be noted that factory alignment is <u>assumed</u> in Haneda et al. (see column 8, line 62) and the correction is for image <u>registration</u> of the image formed between different LED arrays.

Therefore, it is respectfully submitted that the rejections of claims 9 - 12 and 13 - 14 are both in

error since the Leksell et al. and Haneda et al. references do not contain teachings which answer the recitation of the claims to which they are respectively applied or supplement the teachings of Fork et al. in regard to formation of the of the scanning circuits on the same substrate with the light-emitting devices as recited in claim 1 or the specific type of light-emitting device recited in claim 2 or the features of other dependent claim 3 - 8, as discussed above. It is respectfully submitted that the Examiner has not made and cannot make a *prima facie* demonstration of obviousness of the subject matter of claims 9 - 14 based on the references currently applied. Therefore, reconsideration and withdrawal of the rejections under 35 USC §103 is respectfully requested.

New claim 15 is similar to claim 1 except that it omits language presented in new claim 16 and includes recitations generic to the third and fourth preferred embodiments of the invention in which luminance of picture elements is controlled in addition to the use of cumulative exposure in order to enhance continuity of gray scale obtainable. None of the references applied teach or remotely suggest such a perfecting feature and new claims 15 - 18 are patentably distinguished therefrom for at least that reason.

Since all rejections, objections and requirements contained in the outstanding official action have been fully answered and shown to be in error and/or inapplicable to the present claims, it is respectfully submitted that reconsideration is now in order under the provisions of 37 C.F.R. §1.111(b) and such reconsideration is respectfully requested. Upon reconsideration, it is also respectfully submitted that this application is in condition for allowance and such action is therefore respectfully requested.

If an extension of time is required for this response to be considered as being timely filed, a

conditional petition is hereby made for such extension of time. Please charge any deficiencies in fees and credit any overpayment of fees to Attorney's Deposit Account No. 50-2041.

Respectfully submitted,

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APPENDIX

Claim 1:

1. (Amended) An optical printer head comprising:

a picture element array [composed of] comprising picture elements containing light emitting devices arranged in directions of a picture element line and a picture element string in two dimensions;

a horizontal scanning circuit as one peripheral circuit to feed data signals to each picture element string in said picture element array; and

a vertical scanning circuit as another peripheral circuit to sequentially select and activate each picture element line in said picture element array,

wherein said horizontal scanning circuit and said vertical scanning circuit comprise poly-crystal thin-film transistors, and

wherein said picture element array, said horizontal scanning circuit and said vertical scanning circuit are formed [in] on a same insulating substrate.

Claim 13:

13. (Amended) The optical printer head according to claim 5, [further comprising a detecting sensor for detecting] wherein the positional deviation of insertion of said print head in a printer in a direction [vertical] perpendicular to a direction of travelling of an object to which a toner image is transferred from said photosensitive body is detected and further comprising a shift register for shifting data signals in said horizontal scanning circuit to correct the detected positional deviation.

Claim 14:

14. (Amended) The optical printer head according to claim 5, [further comprising a detecting sensor for detecting] wherein the positional deviation of insertion of siad print head in a printer in a direction [vertical] perpendicular to a direction of travelling of an object to which a toner image is transferred from said photosensitive body is detected and further comprising a shift register for shifting data signals in said horizontal scanning circuit to correct the detected positional deviation.

In the Abstract (page 33)

An optical printer head with a plurality of light-emitting devices arranged in two dimensions [is provided which] is capable of providing a desired amount of exposure using light-emitting devices having even small [light-emitting] luminance, ease of [making easy] corrections to a sensitivity of a photosensitive body and to a positional displacement of an object to be printed, [of] performing printing on multiple gray scales and [of] implementing high density and miniaturization. (delete paragraph indent) The optical printer head is so configured that a picture element array [composed of] comprising picture elements containing light-emitting devices arranged in line and string directions in two dimensions, a horizontal scanning circuit to feed data signals to each picture element string in the picture element array and a vertical scanning circuit to sequentially select and activate each picture element in the picture element array are formed on a same insulating substrate to support production of the above effects. The luminance of the picture elements is also made variable by use of a plurality of light-emitting devices and/or variable

drive for each picture element to enhance the continuity of gray scale achieved.